


Understanding Antepartum Testing

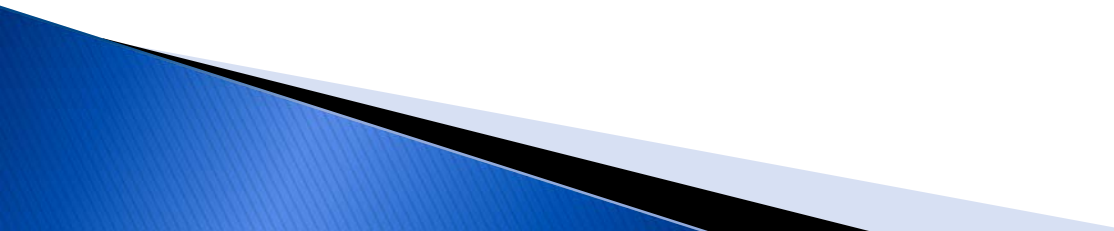
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Purpose and Benefits of Testing

- ▶ Prevent Stillbirth
 - ▶ Detect uteroplacental insufficiency causing fetal hypoxia and acidemia and risk of neurologic injury to the fetus
 - ▶ Detect uteroplacental insufficiency before fetus is unable to tolerate vaginal delivery
 - ▶ Provide forum for more intense preeclampsia/HTN surveillance
 - ▶ Allow mom to take a break and focus on the pregnancy
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Stillbirth Rates in the U.S.

- ▶ US 26,000 per year
 - ▶ 0.64% after 20 weeks
 - ▶ 0.32% after 28 weeks
 - ▶ 25% decrease since 1990
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Stillbirth Rates in Percentages

▶ Low Risk	0.64	▶ Oligo	1.4
▶ GDMA1	0.65–1	▶ Post 41 wks	1.6
▶ DM Insulin	0.6–3	▶ Post 42 wks	2–3.5
▶ Chronic HTN	0.6–2.5	▶ h/o IUFD	0.9–2
▶ Pre Eclampsia	0.9–5.1	▶ Decreased FM	1.3
▶ Pre-E Severe	1.2–2.9	▶ SLE	4–15
▶ IUGR	1–4.7	▶ Cholestasis	1.2–3
▶ Twins	1.2	▶ AMA 35–39	1.1–1.4
▶ Smoking	1–1.5	▶ AMA >39	1.1–2.1
▶ Thrombophilia	1.8–4	▶ PAPP-A < 1 st	0.9
▶ Thyroid	1.2–2	▶ BMI >30	1.3–1.8
▶ ART	1.2	▶ BMI 25–29	1.2–1.6
		▶ *Shaffer UCSF conf 6/2010	



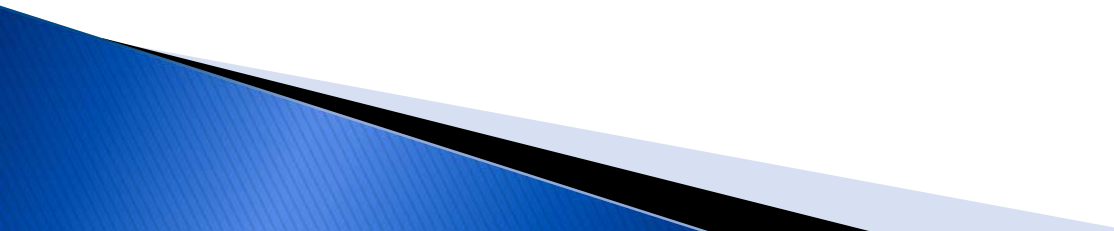
Risks of Testing

- ▶ Iatrogenic prematurity
- ▶ Complications of labor induction
- ▶ Iatrogenic cesarean birth
- ▶ Inconvenience to patient
- ▶ Salvage of babies with severe neurologic injury
- ▶ Use of resources both in testing and in obstetric interventions
- ▶ Relatively little randomized, controlled evidence to support use

Balancing Act

- ▶ Risks of induction versus risk of stillbirth or neurologic injury to fetus
- ▶ Risk of prematurity versus risk of intrauterine fetal demise or fetal neurologic injury

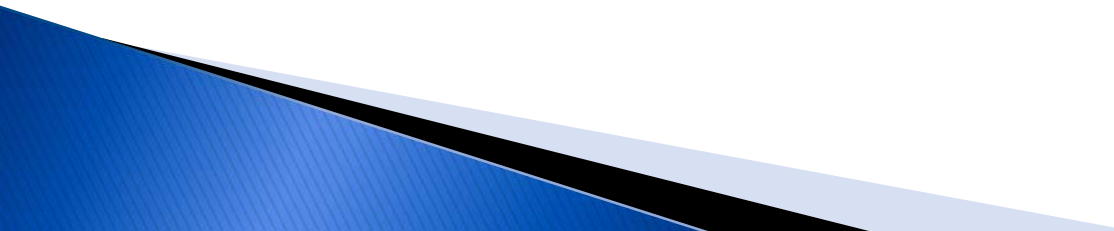
Types of Testing

- ▶ Fetal Movement monitoring by mother “Kick Counts”
 - ▶ Fundal height measurement
 - ▶ Ultrasound for fetal growth
 - ▶ Biophysical Profile
 - ▶ Modified Biophysical Profile: AFI/NST
 - ▶ Contraction Stress Test
 - ▶ Umbilical Artery Doppler
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Fetal Movement

- ▶ Fetus with hypoxia or acidemia will conserve energy by moving less
- ▶ Fetus with neurologic injury will move less
- ▶ Significant variation in maternal movement perception
- ▶ No defined threshold for alarm found in studies
 - 10 movements in 12 hours
 - Focused on fetus 10 in 2 hours or 4 in 1 hour
- ▶ Decreased fetal movement should be assessed with a NST immediately

Fundal Height

- ▶ Measure in centimeters from the symphysis to the top of the fundus
 - ▶ Measurement in centimeters matches weeks, especially from 18–32 weeks.
 - ▶ If more than 2 cm less consider ultrasound for fetal growth. If more than 2 cm greater consider possibility of macrosomia or polyhydramnios.
 - ▶ May not be accurate with significant obesity or uterine fibroids.
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Ultrasound for Fetal Growth

- ▶ Best test for diagnosis of growth restriction
- ▶ Look at relationship of HC/BPD, AC, FL
 - Relatively low AC most concerning for uteroplacental insufficiency
 - Relatively low HC or symmetric decrease suggests possible fetal infection (CMV, etc)
- ▶ Make sure to assess based on correct EGA/EDD
- ▶ False positives mostly due to constitutionally small—look at risk factors, maternal and paternal stature and dates

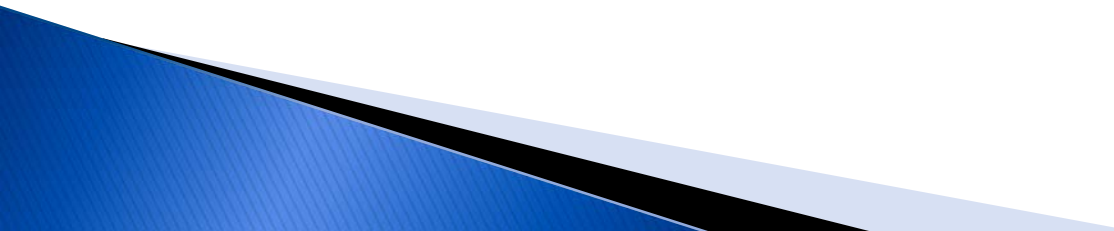
Biophysical Profile

- ▶ Five components:
 - ▶ AFI
 - ▶ NST
 - ▶ Fetal breathing
 - ▶ Fetal movement
 - ▶ Fetal Tone
- ▶ Each component worth 2 points. Score 1,2,4,6, or 10

Biophysical Profile

- ▶ Risk of stillbirth within one week with normal BPP 0.08%
- ▶ Decrease in fetal mortality of 60–75% as compared to historical controls in one cohort of 18,000
- ▶ Studies show correlation between BPP and umbilical artery pH.
- ▶ Positive predictive value of only 50%
- ▶ If 8 points on ultrasound exam, NST not needed
- ▶ Can take 30–45 minutes of observation if fetal sleep cycle
- ▶ Influenced by maternal medications or drugs that suppress neurologic system

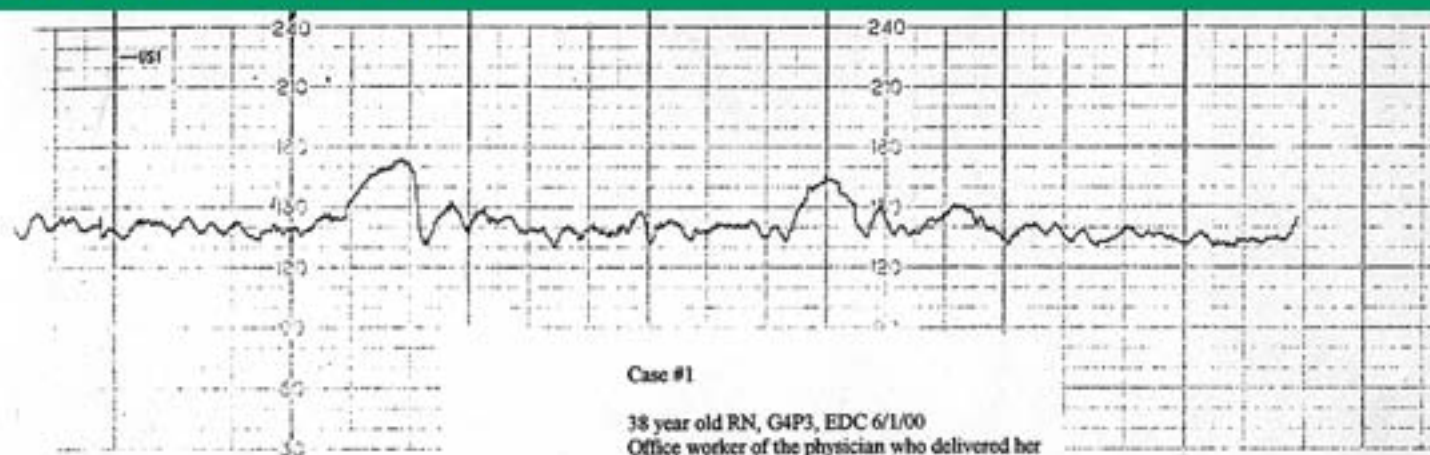
Modified Biophysical Profile

- ▶ NST and AFI
 - ▶ Stillbirth rate within one week 0.08%
 - ▶ 60% false positive rate
 - ▶ Typically performed twice a week
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Non-Stress Test

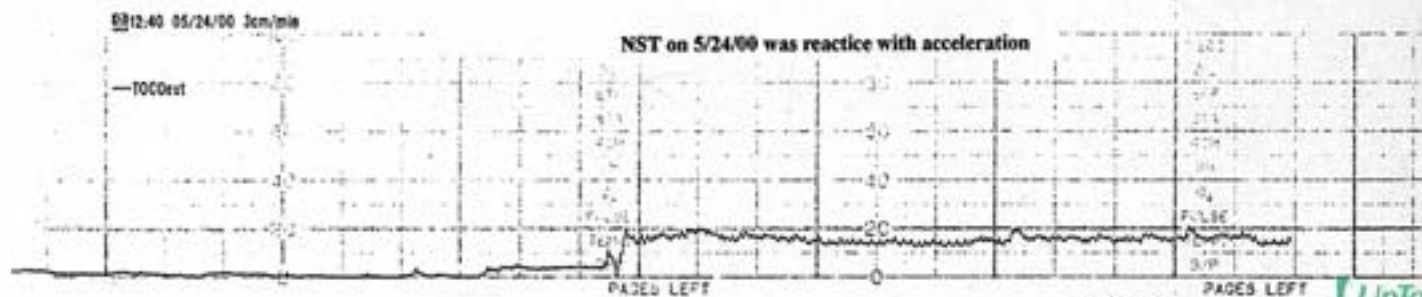
- ▶ Moderate variability and two 15 beat by 15 sec accels in twenty min. 10 by 10 less than 32 wks. Loss of reactivity can be earlier sign of uteroplacental insufficiency
- ▶ Reflects acute hypoxia
- ▶ False negative rate 0.3%
- ▶ False positive rate 55% (back-up test normal)
- ▶ 20% will have lates, low apgars, IUFD during delivery
- ▶ Variables occur in up to 50%. If non-repetitive and less than 30sec no action needed.

Reactive nonstress test performed eight days before the patient's estimated delivery date



Case #1

38 year old RN, G4P3, EDC 6/1/00
Office worker of the physician who delivered her
Prenatal course uncomplicated



NST on 5/24/00 was reactive with acceleration

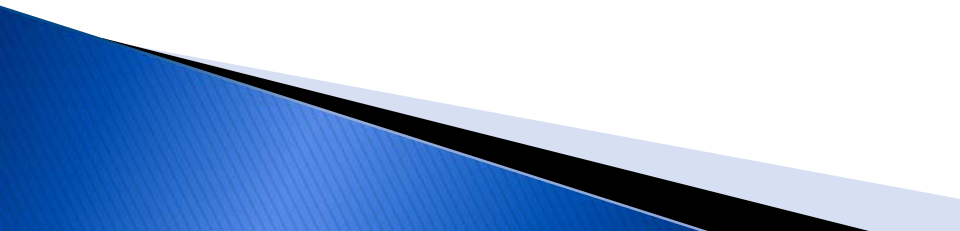
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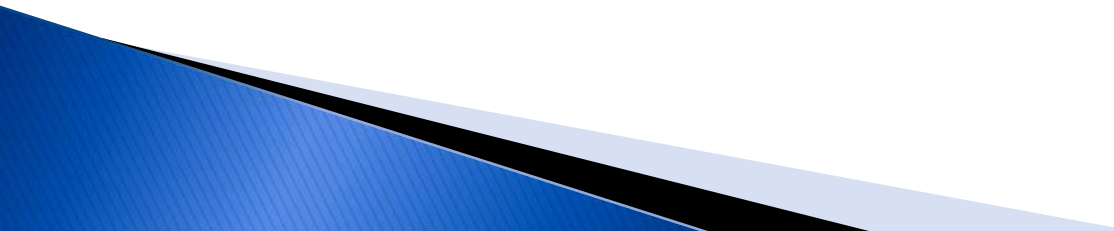
UpToDate



Amniotic Fluid Index

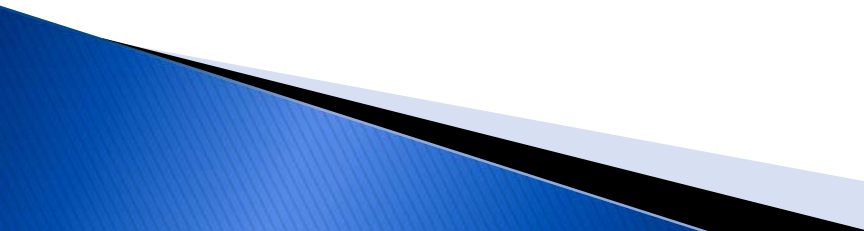
- ▶ Blood flow shunted away from kidneys leading to decrease fluid production
 - ▶ Can reflect chronic hypoxia- average 15 days from normal fluid to oligohydramnios
 - ▶ Measure the depth of the deepest pocket in each of four quadrants. Total should be between 5 and 24 cm
 - ▶ Can also measure single deepest pocket (SDP)
 - ▶ Poor sensitivity and specificity
 - ▶ Remember to consider rupture of membranes or fetal renal abnormality as potential etiology
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Contraction Stress Test

- ▶ Contractions cause temporary hypoxia and late decelerations in fetus with uteroplacental insufficiency
 - ▶ Rate of stillbirth within one week of negative test 0.04%
 - ▶ 50% false positives if FHT otherwise reactive
 - ▶ Need to stimulate contractions for test—may be contraindicated in some situations
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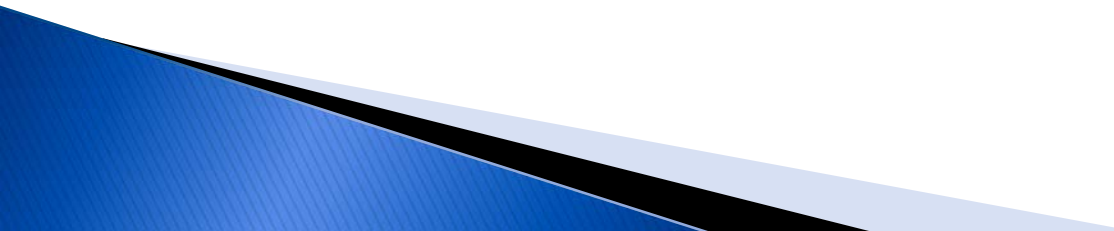
Umbilical Artery Doppler

- ▶ Elevated systolic to diastolic ratio >3 or resistance index >0.6 are considered abnormal
 - ▶ Ratio normally declines as pregnancy progresses
 - ▶ Absent or reversed end diastolic flow is an ominous sign of uteroplacental insufficiency with increased pressure in the placental compartment and increased resistance in fetal venous system and may precede abnormal BPP
 - ▶ Predictive of placental changes with preeclampsia and fetal growth restriction
 - ▶ Randomized trials have been done and support use for growth restricted fetuses
 - ▶ Outcomes are not improved in low risk pregnancies and for some other risk factors
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Middle Cerebral Artery Doppler, Uterine Artery, and Venous Doppler

- ▶ All under investigation with mixed results
- ▶ MCA
 - Blood preferentially shunted to fetal brain when uteroplacental insufficiency
 - Use to monitor for fetal anemia in conditions such as isoimmunization
- ▶ Fetal and umbilical venous dopplers are also being investigated. Umbilical venous system becomes pulsatile with fetal growth restriction.
- ▶ Uterine artery doppler is also under investigation

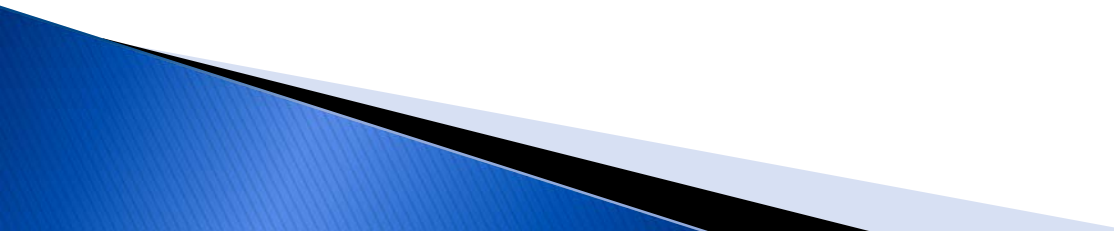
When and Why to Monitor

- ▶ Maternal risk for uteroplacental insufficiency
 - ▶ Local standard to do NST twice a week and AFI weekly
 - ▶ Once a week NST acceptable in certain situations
 - ▶ Dopplers are usually weekly
 - ▶ See Wiki page for internal guidelines
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Hypertensive Disorders of Pregnancy

- ▶ Preeclampsia, severe hypertension, and mild to moderate hypertension with suspected growth restriction clear indications for monitoring
- ▶ Mild to moderate hypertension without growth restriction is controversial
- ▶ We generally monitor if BP > 140 systolic or 90 diastolic and use monitoring to follow more closely for superimposed preeclampsia.

GDM and Diabetes in Pregnancy

- ▶ Insulin dependent diabetes associated with stillbirth. Early studies did not differentiate between Type I and Type II
 - ▶ GDMA2 usually monitored like pregestational Diabetes but no data on milder cases
 - ▶ GDMA1 well controlled with nutritional intervention does not need antepartum testing
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Postdates

- ▶ Biweekly modified biophysical profile starting at 41 weeks
- ▶ No role for umbilical artery dopplers



Prior Fetal Loss

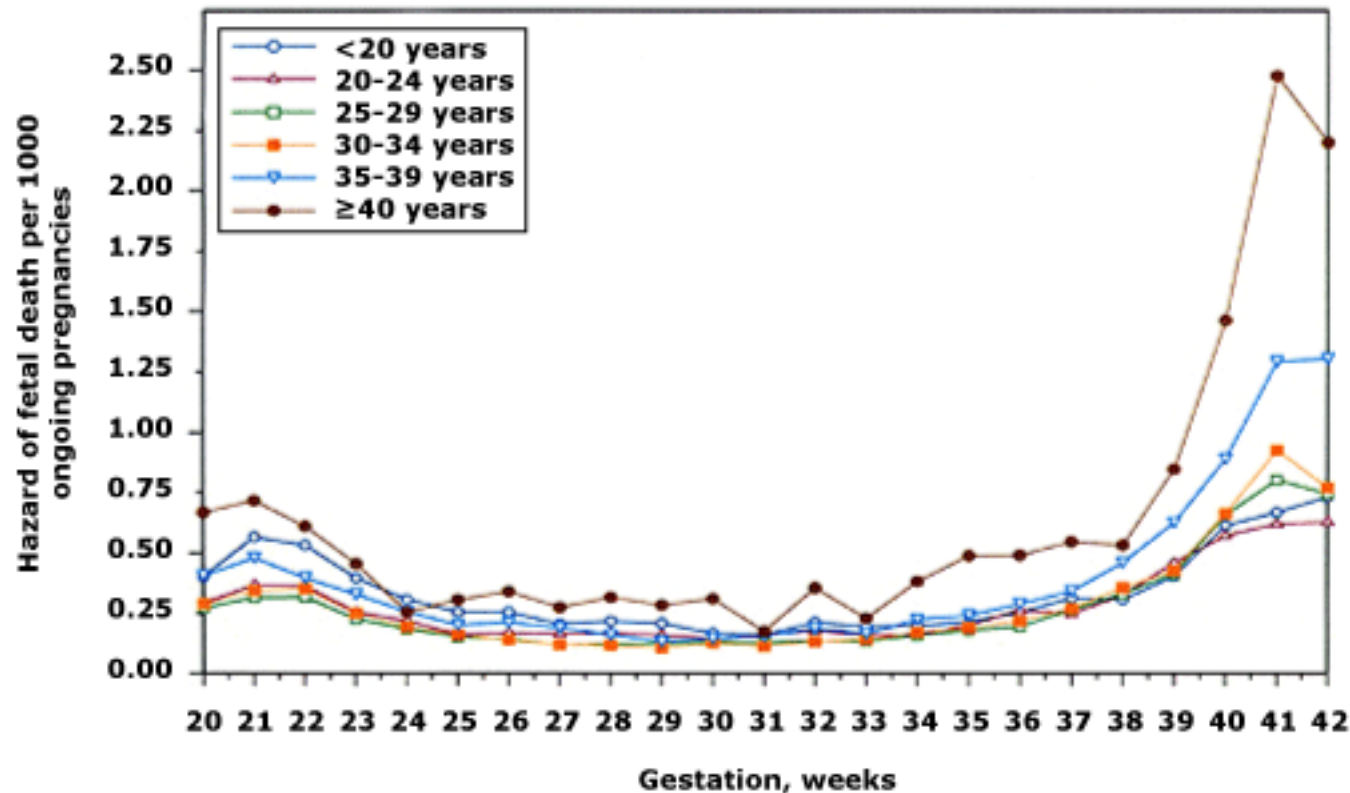
- ▶ 2–10% chance of second fetal loss
- ▶ No randomized trials of benefits of fetal monitoring
- ▶ No correlation with GA of risk of prior demise
- ▶ Start at 32 weeks



Advanced Maternal Age

- ▶ Increase in stillbirth rate after eliminating other confounding risk factors
- ▶ We are currently suggesting monitoring 35 years and older starting at 37 weeks. Risk is higher for 40 yrs and older.

Hazard (risk) of stillbirth for singleton births without congenital anomalies by maternal age and gestational age, 2001-2002



Older women experience an increased risk of stillbirth at all gestational ages, and this risk is magnified at term.

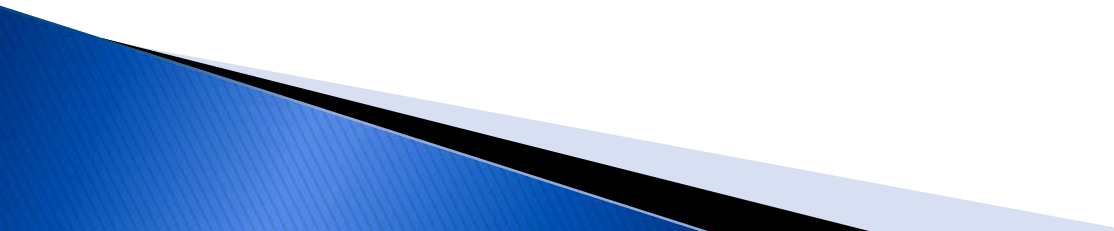
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Elevated Maternal BMI

- ▶ Increased stillbirth associated with increased pregestational BMI not attributable to other risk factors
- ▶ Concern that increased difficulty monitoring this population will lead to more iatrogenic morbidity
- ▶ We are currently not recommending monitoring solely for increased BMI (consistent with UCSF)
- ▶ Consider growth sono if FH difficult
- ▶ No evidence to establish whether fetal monitoring prevents perinatal morbidity and mortality

Cholestasis of Pregnancy

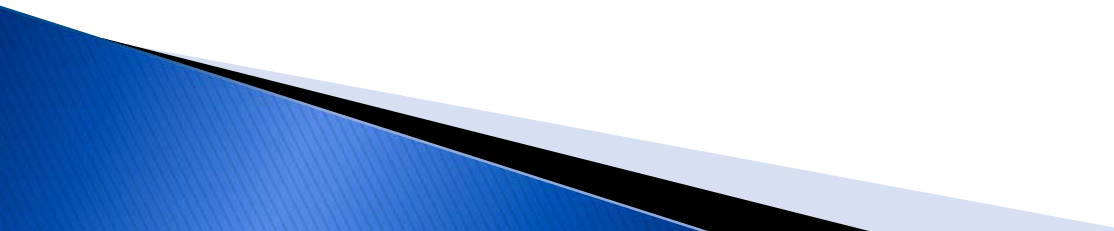
- ▶ Monitoring recommended but.....
 - ▶ Stillbirth thought not to be predicted by fetal monitoring
 - ▶ Some cases may be due to fetal arrhythmia
 - ▶ Thus induction 37–38 weeks
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Multiple Gestation

- ▶ Higher risk of fetal growth restriction, preeclampsia, diabetes, AMA
- ▶ Risk greater with monochorionic twins
- ▶ Discordant growth can indicate a problem
- ▶ Dichorionic twins with concordant normal growth at lower risk for stillbirth
- ▶ Single Deepest Pocket SDP (nl 2–8cm) or subjective evaluation used to assess fluid volume

Other conditions

- ▶ Polyhydramnios associated with fetal abnormalities, diabetes, macrosomia, and poorer outcomes
 - ▶ Abnormalities in first or second trimester testing
 - ▶ Maternal thrombophilia
 - ▶ IVF pregnancies
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Conclusions

- ▶ Keep risk factors and potential complications for each maternal/fetal situation in mind when following protocols.
 - ▶ Understand data on benefit of Antepartum Testing is severely limited and the rationale is based mostly on theory, anecdotal evidence, and tradition.
 - ▶ Involve the patient through accurate education about the risks and benefits of the testing and subsequent interventions.
 - ▶ Be mindful of emotional toll of fetal loss or compromise and the impact of this emotion on interventions or lack of intervention.
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